



Asian Journal of Research in Chemistry and Pharmaceutical Sciences

Journal home page: www.ajrcps.com



A REVIEW ON *EPIPHYLLUM OXYPETALUM* (DC) HAW

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ABSTRACT

Epiphyllum oxypetalum (DC) Haw. Belonging to the family Cactaceae is one of the most cultivated species in the genus. It is a variety of night blooming cereus with several traditional medicinal uses. The plant is traditionally found to be useful for many ailments like cough, uterine bleeding, shortness of breath, neutralizing blood clot, pain, and to treat bloody phlegm. The plant has been reported to possess different classes of compounds mainly Glycosides, Saponins, Steroids, Phenols, Proteins, Resins, Tannins and Terpenoids. Few pharmacological properties including antioxidant, anti-inflammatory, anti-bacterial activity have been reported for this plant. The present review includes updated information on pharmacognostic, nutritional and medicinal values of *Epiphyllum oxypetalum*.

KEYWORDS

Epiphyllum oxypetalum, Traditional uses and Pharmacological properties.

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INTRODUCTON

Medicinal plants are utilized in just about all cultures as a source of medicine. The Indian landmark incorporates a terribly made diversity of plant species in a huge selection of ecosystem. Medicinal plants are the pillars of ancient medicine, which implies over 3.3 billion individuals within the less developed countries, utilize medicinal plants on regular basis. Current estimates counsel that, in several developing countries, an oversized proportion of the population depends heavily on ancient practitioners and medicinal plants to satisfy primary health care wants. Furthermore, an increasing reliance on the utilization of medicinal plants in industrialized societies has been copied to

the extraction and development of many medicines^{1,2}.

Epiphyllum oxypetalum is a succulent plant and one in all the foremost cultivated species within the genus. It is a variety of night blooming cereus. The genus *Epiphyllum*, meaning “on the leaf” in Greek contains a spread of 19 species. They are called so because the blooming of the flowers happens directly on the leaves. They inhabit in the jungles of Central and South America, and Mexico. The genus *Epiphyllum* is true cacti however is commonly labelled as “epicacti” or “jungle cacti” to differentiate it from the related desert flora. Jungle cacti have leaf-like structures that resembled thickened stems which have protruding spines whereas the *Epiphyllum* are not covered with spines, rather they are covered with hair bristles or tiny spines in the areolas. The epiphytic species contain fibrous roots that hold onto decaying vegetative matter and grow in small rock or climb in trees. *Oxypetalum* is a Latin name derived with relevancy to the acute form of the petals. It is originated from Sri Lanka, Central and North America, it is also seen in South East Asian countries, Venezuela and Brazil. In India, it is distributed in Mumbai, Bangalore, Chennai, Ranchi, and Uttarakhand³. *Epiphyllum oxypetalum* is a fast-growing plant, belongs to the family Cactaceae and is one of the most popular species under the genus. In India, it is known as Bramhakalam and considered as a sacred plant. The Shoshone Indian tribe calls it “Pain in the heart” and used for heart pain. It is also known by other names such as the Dutch man’s pipe cactus, Queen of the night, Nishaghandhi, Lady of night etc⁴.

This flower is named after Brahma, the God of creation (as per Hindu mythology), blooms only for one night in the entire year. The blooming lasts only for a few hours. This plant is related to the story of how Brahma emerged from Vishnu's navel in a lotus flower. It is believed as a sacred flower and does not bloom in all homes. The home where it blooms is considered lucky and is a sign of prosperity and believed that who pray to God while the flower is blooming get their wishes fulfilled⁵.

The present study is aimed to provide current information regarding the pharmacological potential of *Epiphyllum oxypetalum*.

Pharmacognostic Characteristics

Epiphyllum oxypetalum is considered to be popular as an ornamental plant. It produces a large white coloured flower that blooms for a single night. Thus, it is referred to as night blooming cereus.

Growth Form

Perennial shrub. It is an epiphytic cactus, freely branched that grows up to 6m tall in the wild.

Habitat

Mainly grown in the tropical rain forest and temperate forest.

Morphological Characteristics

Foliage

This species does not produce leaves. Instead, they turn out modified stems that seem like leaves and serve similar functions.

Stems

Flattened stems are composed of a round, and thick midrib surrounded by fleshy wings that have a scalloped edge. The stems are erect, branched, and climbing. Primary stems are terete, up through 6m long, flattened latterly, and ligneous at their bases. Secondary stems are flat, numerously branched, dark green in colour, elliptic, acuminate and up through 15-50×5-12cm⁶.

Flowers

Fragrant, star-shaped flowers (28 cm long, 13 cm wide) are composed of 25-30 white, linear petals, nocturnal and very fragrant⁵. Benzyl salicylate is responsible for the characteristic odour. Pericarpels are nude, slightly angled, and green. Bracteoles are short and narrow. Receptacles are up through 13-18 cm, the base is green, 4-9mm in diameter brownish, and arching. Outer petals are linear, acute, 8-10cm long, and reddish through amber. Inner petals are whitish, oblanceolate, oblong, acuminate, and up through 8-10 cm long and 2-5 cm wide. Stamens are greenish white or white, and slender. An elaborate white stigma protrudes from the centre of the flower. Styles are greenish white, pale yellow, or white, 4mm thick, as long as inner tepals, and with many lobes⁷. Flowers begin to open at 8-10PM, reach their maximum fullness at 12-3AM, and close

before dawn. Flowering occurs infrequently. Flower buds are formed at the end of modified stems that look like leaves. They swell slightly several hours before blooming later at night⁶.

Flowering season

June-October

Fruits

Fruits appear to be rare, which is purplish red in colour, oblong, 16×5.7 cm, seeds are 2-2.5×1.5mm⁷.

Organoleptic Characteristics

The leaves are dark to light green in colour, glabrous texture with an astringent taste and a characteristic odour. Colour of the dried powder seems to be yellowish brown⁷.

Microscopy

Transverse section of the leaves depicts thick mesophyll tissue which is not differentiated into palisade and spongy. The epidermis consists of 2-3 layers of uniform cells. The epidermis is nearly smooth with few trichomes while stomata are paracytic and sometimes tricytic. Leaf tissue is filled with mucilage and mucilage canals. Midrib has avascular bundle which consists of sclerenchyma sheath, beneath is phloem zone, inner to it is xylem vessels, in the middle of the vascular cylinder, pith tissue is present which comprises large thin-walled cells filled with starch grains. Mesophyll cells near the epidermis have chlorophyll pigments, inner mesophyll cells have starch grains, often star-shaped cystolith crystals found; which are about 500-750 microns long. Some cells also have a thin rod-like crystal. Numerous small and large mucilage canals are present in the hypodermal zone. Stomatal index was found to be 1.582⁷.

Cultivation

The plant, though a cultivated species, grows well under the bright, indirect sunlight. Grow in detritus-rich sandy and slightly acidic soil. It prefers moist, but well-drained soil. Water the plant regularly during the summer. It is propagated by rhizome, herbaceous stem, and leaf cuttings or layering. It can also be grown indoors. To grow the plant, a leaf is planted in the soil or is placed horizontally on the soil. The cut stalk also can be immersed in water. In about three weeks adventitious roots come

out and then can be planted in a pot containing soil. From margins of phylloclade bulbils like structures grow⁸.

Taxonomic Classification

Taxonomical classification of *Epiphyllum oxypetalum* is shown in Table No.1.

Synonyms

Cereus oxypetalus, *Cactus oxypetalus*, *Cereus latifrons*, *Epiphyllum aacuminatum*, *Epiphyllum grande*, *Cactus oxypetalus*, *Phyllocactus oxypetalus*⁹.

Common names

Night blooming cereus, Dutch man's pipe, Queen of night, Lady of night, Dutch man's pipe cactus, Broadleaf Epiphyllum, Orchid Cactus, Jungle Cactus⁶.

Vernacular Names

Chinese : Jin Gou Lian, Qiong Hua, Tan-Hua, Yue Xia Mei Ren

French : Reine De La Nuit

German : koniger Der Nacht

India : Gul-E-Bakawali, Nishagandhi, Brahma kamal, Bakavali

Indonesia : Wijaya Kusuma

Japanese : Gekka Bijin

Malaysia : Bunga Bakawali

Chemical Composition

Dandekar R *et al*, (2015) reported that the GC-MS analysis of alcohol extract of *Epiphyllum oxypetalum* leaves revealed the presence of compounds such as Ethanone, 1-(2-Hydroxy-5-methylphenyl)-; 4-Hydroxy-2-methylacetophenone; Megastigmastrienone; Cycloocta-1, 3, 6-triene, 2, 3, 5, 5, 88-hexamethyl; 4-((1E)-3-Hydroxy-1-propenyl)-2-methoxyphenol; 2, 5-Dihydroxy-4-sopropyl-2, 4, 6-cycloheptatrien-1-one; n-Hexadecanoic acid; Octadecanoic acid; phytol; 6-octen-1-ol, 3, 7-dimethyl; Stigmsterol; Cholesta-22, 24-dien-5-ol, 4, 4-dimethyl; 22-stigmasten-3-one. Allyldimethyl (prop-1-ynyl) silane; Sulfurous acid, Cyclohexylmethyl hexyl ester; Hepacosane; Nonadecane, 2-Methyl-; Hexadecane, 2, 6, 10, 14-Tetramethyl-; Octadecane, 2-methyl-; Eicosane, 2-Methyl-; Spinasterone; 4, 22-stigmastadiene-3-one; tetracosane; Hentriacontane; Stigmas-4-en-3-one; testosterone cypionate⁴.

Traditional Uses

The phylloclades contain some active ingredients and show anti-bacterial activity. The stem is additionally used medicinally to cure dropsy and cardiac affections. Vietnamese individuals use petals of the faded flower to make soups which are expected to have tonic and aphrodisiac medicinal properties. Flower also has a power that can speed up the wound healing. Also, it is used in bloody phlegm and cough, uterine bleeding and shortness of breath. In addition, the constituents of *Epiphyllum oxypetalum* are believed to have strong ability to stifle pain and are capable of neutralizing blood clot⁴.

Parts used

Leaf and Flower

Pharmacological Activities

Antioxidant activity

Dandekar R *et al.*, (2015) reported the *In vitro* antioxidant activities of *Epiphyllum oxypetalum*. The alcohol and aqueous extract of dried leaves of *Epiphyllum oxypetalum* were evaluated for free radical scavenging activities by using hydrogen peroxide scavenging and DPPH assay method. In DPPH method maximum free radical scavenging activity was found to be (60.37±1.67) than that of aqueous extract (34.23±0.88). The maximum percentage of inhibition in alcohol and aqueous extract was observed at 2000µg/ml. In hydrogen peroxide scavenging method the maximum inhibition by alcohol extract (43.76±0.97) and aqueous extract (27.07±0.16) was shown at 500µg/ml concentration. In both methods, ascorbic acid is used as a standard reference^{10,11}.

Anti-inflammatory activity

Dandekar R *et al.*, (2015) reported the anti-inflammatory activity of alcohol and aqueous extract of *Epiphyllum oxypetalum* leaves. The study was carried out by using *In vitro* method which included human red blood cell membrane stabilization and inhibition of protein denaturation method. The *In vivo* anti-inflammatory activity was assessed on Wistar albino rats using carrageenan-induced paw oedema model. The percentage inhibition in protein denaturation and membrane stabilization was found a dose-dependent increase

in both alcohol extract and aqueous extract. Maximum inhibition 39.45% and 55.70% was seen at concentration 300µg/ml in alcohol and aqueous extract respectively. In carrageenan-induced paw oedema, the extract was tested at 200, 400, and 600mg/kg, p.o. Percentage inhibition of rat paw oedema by alcohol and aqueous extract of *Epiphyllum oxypetalum* was found to be maximum at 600mg/kg after 3 hours of carrageenan induction. The study concludes that the aqueous extract of *Epiphyllum oxypetalum* shows more anti-inflammatory activity in both *In vitro* and *In vivo* method than that of alcohol extract¹².

Nanoparticle biosynthesis and antibacterial activity

Priti Paralikar *et al.*, (2014) reported the biogenic synthesis of silver nanoparticles due to the reduction of silver nitrate by an aqueous leaf extract of *Epiphyllum oxypetalum* and its antibacterial activity. The synthesized silver nanoparticles were characterized by UV-Visible spectroscopy, NTA analysis, FT-IR analysis, and Zeta potential. The result showed that silver nanoparticles thus synthesized have an average particle size of 86nm. The synthesized silver nanoparticles of aqueous leaf extract of *Epiphyllum oxypetalum* was tested for antibacterial activity both in alone and in combination with commercial antibiotics against *Propionibacterium acne*, *Pseudomonas aeruginosa* and *Klebsiella pneumonia* by the disc diffusion method. The result of the study revealed the significant bactericidal activity of the synthesized silver nanoparticles. The study concludes that the efficiency of silver nanoparticles increased when accessed in combination with antibiotics against test organism¹³.

Antimicrobial potential

Upendra R S *et al.*, (2012) reported the phytochemical properties, nutritive values and antimicrobial potential of leaf extract of *Epiphyllum oxypetalum*. The nutritive values of the plant showed a significant presence of proteins (14mg/g), fatty acids (4.6mg/g), and vitamin niacin (0.18mg/g). Preliminary phytochemical screening of the petroleum ether, acetone and ethanol extract of *Epiphyllum oxypetalum* revealed the presence of

Glycosides, Saponins, Steroids, Phenols, Proteins, Resins, Tannins, and Terpenoids while reducing sugars, alkaloids, flavonoids, sterols, phlobatannins, and acidic compound are found absent. The antimicrobial activity of petroleum ether, acetone and ethanol extract of the leaves against *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella pneumonia* and *Bacillus subtilis* and antifungal activity against *Aspergillus terreus*, *Aspergillus oryzae*, *Aspergillus niger* and *Rhizopus oryzae* were reported at different concentration of 25, 50, 75 and 100µg/ml using disc diffusion method. This study clearly revealed the broad spectrum antibacterial nature of the plant and all three extracts (petroleum ether, acetone, and ethanol) were found to be ineffective against the tested fungal pathogens¹⁴.

Table No.1: Taxonomy of *Epiphyllum oxypetalum*

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Caryophyllales
Family	Cactaceae
Subfamily	Cactodiae
Genus	<i>Epiphyllum</i>
Species	<i>Oxypetalum</i>
Binomial name	<i>Epiphyllum oxypetalum</i> (DC.) Haw.



Figure No.1: Whole plant



Figure No.2: Flower



Figure No.3: Leaves



Figure No.4: Flower buds

CONCLUSION

The literature survey unveiled that the plant *Epiphyllum oxypetalum* is an important medicinal plant that can be used to treat various diseases. The plant shows the presence of many chemical constituents which are responsible for diverse pharmacological and medicinal properties. However the plant is one of the under-utilized resources available in the tropical region, the medicinal activities are yet to be explored and expect an exemplary outcome in the future.

ACKNOWLEDGEMENT

We are very thankful to Department of Pharmacology, Devaki Amma Memorial College of Pharmacy, Malappuram, Kerala, India.

CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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Please cite this article in press as: Prajitha P et al. A review on *Epiphyllum oxypetalum* (Dc) Haw, *Asian Journal of Research in Chemistry and Pharmaceutical Sciences*, 7(3), 2019, 824-830.